

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. 1.-42. [CANCELLED]

43. (New) A flotation device comprising:

a tank for containing slurry incorporating minerals to be extracted;

a feed inlet for admission of slurry into the tank;

an agitator to agitate the slurry within the tank comprising a drive mechanism, a primary rotor connected to the drive mechanism by a drive shaft, and an auxiliary agitation blade, the primary rotor being adapted to induce a primary fluid flow and a secondary fluid flow above the primary fluid flow within the tank, and the auxiliary agitation blade being disposed for coaxial rotation above the primary rotor to induce axial fluid flow in a downward direction, thereby to supplement the secondary flow induced by the primary rotor; and

an aerator comprising an air blower and a fluid conduit for directing air from the blower into the primary rotor so as to aerate the slurry whereby floatable minerals in suspension form a surface froth in the tank.

44. (New) The flotation device according to claim 43, wherein said auxiliary agitation blade induces substantially only axial flow in a downward direction.

45. (New) The flotation device according to claim 44, wherein the auxiliary agitation blade, in use, acts as an axial impeller to supplement an axial secondary fluid flow of the primary rotor.

46. (New) The flotation device according to claim 44, wherein the auxiliary agitation blade is part of an axial impeller.

47. (New) The flotation device according to claim 43, wherein the auxiliary agitation blade defines an angle of incidence that is substantially constant along the length of the blade.

48. (New) The flotation device according to claim 47, wherein the angle of incidence is between 15 degrees and around 75 degrees with respect to the direction of travel of the auxiliary agitation blade.
49. (New) The flotation device according to claim 43, wherein the auxiliary agitation blade defines an angle of incidence that varies along the length of the blade.
50. (New) The flotation device according to claim 43, wherein the pitch of the auxiliary agitation blade is adjustable depending on specific system parameters.
51. (New) The flotation device according to claim 50, wherein the specific system parameters include slurry density, slurry viscosity and flow characteristics within the tank.
52. (New) The flotation device according to claim 43, wherein the auxiliary agitation blade comprises a substantially straight leading edge.
53. (New) The flotation device according to claim 43, wherein the leading edge of the auxiliary agitation blade is curved.
54. (New) The flotation device according to claim 43, wherein the auxiliary agitation blade is releasably connected to the drive shaft to allow its position relative to the primary rotor to be adjusted.
55. (New) The flotation device according to claim 43, wherein, in use, the auxiliary agitation blade is connected to the shaft at around a midheight of the tank.
56. (New) The flotation device according to claim 43, wherein the auxiliary agitation blade is connected to the drive shaft for conjoined rotation with the primary rotor.
57. (New) The flotation device according to claim 43, wherein the auxiliary agitation blade is connected to the drive shaft by at least one of a clamp, welds and bolts.
58. (New) The flotation device according to claim 57, wherein the clamp is formed of two inter-engageable clamping halves.

59. (New) The flotation device according to claim 57, wherein inner walls of the clamp together define a generally cylindrical clamping surface.
60. (New) The flotation device according to claim 43, wherein the auxiliary agitation blade comprises a resilient protective layer coating its exterior surfaces.
61. (New) The flotation device according to claim 60, wherein the protective layer is greater than around 3mm thick.
62. (New) The flotation device according to claim 60, wherein the protective layer is between around 5mm and around 7mm thick.
63. (New) The flotation device according to claim 43, comprising a pair of said auxiliary agitation blades, which in use extend radially outwardly from diametrically opposite sides of the drive shaft.
64. (New) The flotation device according to claim 43, comprising at least three of said auxiliary agitation blades, which in use are equally spaced around the perimeter of the drive shaft.
65. (New) The flotation device according to claim 63 or 64, wherein, in use, each auxiliary agitation blade intersects the shaft at an angle of incidence of around 45 degrees.
66. (New) The flotation device according to claim 43, wherein the fluid conduit comprises an axial bore extending through the drive shaft.
67. (New) The flotation device according to claim 43, wherein the fluid conduit is disposed to direct air into the rotor from underneath.
68. (New) The flotation device according to claim 43, comprising a stator surrounding the rotor.
69. (New) The flotation device according to claim 43, wherein the agitator is adapted for use in a three phase environment comprising water, solids and air.

70. (New) The flotation device according to claim 43, comprising a froth deflection cone extending around the drive shaft adjacent the top of the tank, the smallest diameter of the cone being at its lowermost end nearest the rotor.

71. (New) The flotation device according to claim 70, comprising a peripheral overflow launder extending around the inside top of the tank and wherein the deflection cone is disposed to deflect froth outwardly toward the overflow launder for recovering mineral enriched froth from the surface of the tank.

72. (New) The flotation device according to claim 70, wherein the deflection cone is disposed to prevent vortexing at the tank surface.

73. (New) The flotation device according to claim 70, wherein the auxiliary agitation blade is located substantially midway between the top of the rotor and the bottom of the deflection cone.

74. (New) The flotation device according to claim 70, comprising a reagent addition tube extending downwardly into the tank through the deflection cone.

75. (New) The flotation device according to claim 43, adapted for agitating a slurry containing up to around 55% solids.

76. (New) The flotation device according to claim 43, wherein the tank has a capacity of at least 50m³.

77. (New) The flotation device according to claim 43, wherein said auxiliary agitation blade has a diameter of around 15% to around 35% of the tank diameter.